

2.7 Flood Hazard Area Zoning

BACKGROUND AND PURPOSE

This chapter provides planning boards with some basic background information on protecting residents and their property from floods through the prevention of adverse impacts caused by development in the floodplain, and a model ordinance that can be adopted by communities or used to amend existing floodplain ordinances.

Flooding is a routine natural process that occurs when flows exceed the capacity of stream channels to carry them. The adjacent lands, called floodplains, serve an important function. As the water spreads out over the floodplain it slows down, and as a result, both downward erosion in the riverbed and lateral erosion of the riverbanks are reduced. Vegetation on the banks and in the floodplain slows the floodwaters further.

RELATED TOOLS:

- Stormwater Management
- Erosion and Sediment Control During Construction
- Shoreland Protection
- Wetlands Protection

FIGURE 2.7.1 Floodplain Diagram

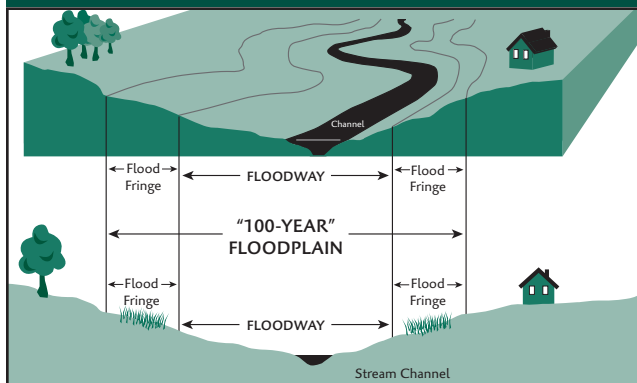


FIGURE 2.7.2 Church Street Flooding in Keene, 1936



The most disastrous flooding in New Hampshire during recent decades resulted from prolonged heavy rains or repetitive rain events. In the 1990s, hurricanes and other heavy rains in summer and fall caused flooding on a magnitude to warrant six disaster declarations. More recently, in October 2005, the remnants of a tropical storm and subtropical depression merged with cold fronts to produce 9 to 11 inches of rainfall in Cheshire County over just a couple of days (NOAA National Climatic Data Center). Severe flooding occurred in the watersheds of the Cold River, Ashuelot River and Otter Brook as well as along the Connecticut River. News accounts reported more than 1,000 people evacuated, numerous houses washed off their foundations, seven deaths, and five bridges destroyed. Soon after, in mid-May

FIGURE 2.7.3 Alstead Flooding, 2005



2006, 8 to 12 inches of continuous heavy rain over a three-day period caused the worst flooding in New Hampshire since the hurricane of 1938 (NOAA National Climatic Data Center). USGS reported the highest ever flows recorded on 12 rivers in central and southern New Hampshire; six were higher than the predicted 100-year flood. A reported 600 roads were closed, hundreds of families had to evacuate, and dozens of homes were lost.

Floodwaters themselves are dangerous. Just a few inches of swiftly moving water can knock people off their feet, and it only takes a couple feet of water to carry an automobile away. Often the greatest damage from flooding is caused by the debris carried by the floodwaters, or by debris obstructing stormwater flow. Damage to or obstruction of flows through bridges, dams and culverts can have devastating effects.

Flooding is costly both to the victims and the public. In the short term, there is the cost of the emergency response, temporary housing, conducting damage assessments, and the administrative cost of organizing assistance. The long term costs associated with property damage, such as loss of business and personal income, reduction in property values, loss of tax revenues, and infrastructure repair, can be devastating to residents, businesses and the local government. The October 2005 flood described above resulted in \$15.9 million in reported damage, and the May 2006 floods caused tens of millions of dollars in damage (NOAA National Climatic Data Center).

Northern New England's development history brought us to a point where much development is already in the path of floodwaters. In early years, rivers provided both transportation routes and the source of power for mills. As roads developed, these too tended to follow the paths of river courses. The places where rivers and roads came together often became the focal points for development that formed today's cities and villages. In recent decades, the flat, well drained soils of floodplains, often already cleared for agricultural purposes, have attracted residential, commercial and industrial development.

Just as much of the nation's population is concentrated along its east and west coasts, nearly one-third of New Hampshire's population resides in its two coastal counties. As noted geographer Rutherford Platt wrote of the threats of hurricanes,

FIGURE 2.7.4 Coastal Storm



flooding and erosion faced by coastal inhabitants, “Often the very physical characteristics which attract human occupancy are responsible as well for the disaster potential. They [the nation’s perimeters] are the scene of intense competition between public and private interests, between economic and environmental values, and between diverse land and water uses: residence, business, industry, transportation, recreation, and conservation.” (Platt, 1978)

Local flood hazard planning must address these existing activity centers and respect the historical investments that have been made in them, as well as prevent impacts associated with development. Reduction of flood hazards requires a comprehensive approach to both hazard mitigation and watershed management.

Many New Hampshire cities and towns have floodplain regulations that meet the minimum National Flood Insurance Program (NFIP) requirements. The National Flood Insurance Act of 1968 created the NFIP in response to the lack of private market flood insurance and the rising costs of disaster relief to the taxpayer. Property owners are not eligible for the insurance program until their community adopts regulations requiring residential structures to be elevated to or above the 100 year flood elevation. Regulations must also require nonresidential structures (including public facilities) to be flood-proofed, and restrict encroachment on the floodway. The Government Accounting Office estimates that the standards for new construction required by participating communities save about \$1 billion annually in flood damage nationwide (United States General Accounting Office, National Flood Insurance Program – 2004). Most New Hampshire communities participate in the NFIP. At the state level, the NFIP is coordinated through the Office of Energy and Planning (OEP) which provides model ordinances meeting the minimum requirements for NFIP eligibility.

It is important for local officials, residents and business owners to realize that the model ordinances provided by OEP are *only* intended to meet the minimum requirements of the National Flood Insurance Program. They meet the minimum standards for regulation of floodplain development. The NFIP was not intended to

keep the public safe from floods, but to reduce flood damage by putting some parameters on floodplain development in exchange for affordable insurance. In fact, the Federal Emergency Management Agency minimum requirements allow encroachment of the floodplain until the base flood elevation of the floodway has been increased by one foot.

This increased flood elevation has the potential to increase the damage to neighboring properties, as well as to downstream communities receiving the floodwaters with increased velocity and increased erosion and sedimentation. In addition, the minimum standards allow development in the floodplain that will cause the floodplain itself to expand over time. Application of only the minimum NFIP requirements provides a false sense of security for residents in light of these cumulative impacts of development.

Floodplain maps have been developed by the Federal Emergency Management Agency but are only approximations of the flood plain location for insurance purposes. It is important for communities to understand the meaning of the terms used on the floodplain maps developed for their city or town, and what is and is not included on the maps. Table 1 displays the terms used in floodplain maps. In general, “A” or “A” followed by a letter or number represents the 100-year floodplains, which are areas with a 1 percent chance of a flood occurring, or being exceeded, in a given year. In unnumbered “A” zones, no engineering study has been done. The maps in these areas are based on existing data only, such as records or evidence of past floods. “V” designates the areas expected to be affected by the storm surges and a three-foot breaking wave associated with the 100-year coastal storm.

Development in areas labeled with “B”, “C” or “X” are not necessarily safe from flooding. These may be areas between the 100-year and 500-year floodplains, 500-year floodplain, areas where the 100-year base flood is expected to be less than one foot, or other areas with minimal hazard. Flood hazards are not mapped by FEMA for watersheds smaller than one square mile.

FEMA mapping is based on existing watershed conditions, with the exception of the floodway. In general terms, the regulatory floodway is the main channel of the water course. It is demarcated by determining how much area would need to remain unobstructed for the 100-year flood elevation to only increase the water surface elevation by a designated height. In New Hampshire, this elevation is one foot. *(In coastal areas, the floodway is determined based on riverine flooding only, and the wording for the ordinance should be adapted accordingly.)*

FEMA has several programs to provide financial assistance to communities for projects aimed at reducing the potential damage from flooding, including the Flood Mitigation Assistance Program, Pre-Disaster Mitigation Program, and Hazard Mitigation Grant Program. Such projects include removing or raising existing buildings to prevent repeat claims. The Government Accounting Office reported that in New Hampshire flood insurance claims paid to the same property more than once in 10 years between 1978 and 2003 totaled \$2,489,816 (United States General Accounting Office, 2004). In addition, FEMA’s Community Rating System (CRS) program provides an incentive to communities that go beyond the minimum NFIP requirements. Through the Community Rating System program materials, FEMA provides information on a number of approaches communities can take to further reduce damage from flooding and protect the functions of the floodplain. The CRS program encourages conservation of floodplain areas as open space, higher regulatory standards for construction, public education, development of better flood data, and flood preparedness. As an incentive for incorporating some of these approaches into the community’s floodplain management, FEMA reduces flood insurance rates for policyholders in participating communities.

TABLE 2.7.1 Flood Hazard Zone Designations

Designation	Definition
Zone A	The 1 percent annual chance floodplains that are determined in the Flood Insurance Study by approximate methods of analysis. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.
Zone AE and A1-A30	The 1 percent annual chance floodplains that are determined in the Flood Insurance Study by detailed methods of analysis. In most instances, Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.
Zone AH	The areas of 1 percent annual chance shallow flooding with a constant water-surface elevation (usually areas of ponding) where average depths are between 1 and 3 feet. The Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.
Zone AO	The areas of 1 percent shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average flood depths derived from the detailed hydraulic analyses are shown within this zone. In addition, alluvial fan flood hazards are shown as Zone AO on the Flood Insurance Rate Map. Mandatory flood insurance purchase requirements apply.
Zone AR	<p>The zone used to depict areas protected from flood hazards by flood control structures, such as a levee, that are being restored. FEMA will consider using the Zone AR designation for a community if the flood protection system has been deemed restorable by a federal agency in consultation with a local project sponsor; a minimum level of flood protection is still provided to the community by the system; and restoration of the flood protection system is scheduled to begin within a designated time period and in accordance with a progress plan negotiated between the community and FEMA. Mandatory purchase requirements for flood insurance will apply in Zone AR, but the rate will not exceed the rate for an unnumbered Zone A if the structure is built in compliance with Zone AR floodplain management regulations.</p> <p>The property owner is not required to elevate an existing structure when making improvements to the structure. However, for new construction, the structure must be elevated (or floodproofed for non-residential structures) so that the lowest floor, including basement, is a minimum of three feet above the highest adjacent existing grade, if the depth of the Base Flood Elevation (BFE) does not exceed five feet at the proposed development site. For infill sites, rehabilitation of existing structures, or redevelopment of previously developed areas, there is a three-foot elevation requirement regardless of the depth of the BFE at the project site.</p>
Zone A99	The 1 percent annual chance floodplain that will be protected by a federal flood protection system where construction has reached specified statutory milestones. No Base Flood Elevations or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.
Zone D	The areas where there are possible but undetermined flood hazards. In areas designated as Zone D, no analysis of flood hazards has been conducted. Mandatory flood insurance purchase requirements do not apply, but coverage is available. The flood insurance rates for properties in Zone D are commensurate with the uncertainty of the flood risk.
Zone V	The areas within the 1 percent annual chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no Base Flood Elevations are shown within this zone. Mandatory flood insurance purchase requirements apply.
Zone VE	The areas within the 1 percent annual chance coastal floodplain that have additional hazards associated with storm waves. Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.
Zones B, C, and X	The zones that correspond to areas outside the 1 percent annual chance floodplain, areas of 1 percent annual chance sheet flow flooding where average depths are less than one foot, areas of 1 percent annual chance stream flooding where the contributing drainage area is less than one square mile, or areas protected from the 1-percent annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone. Insurance purchase is not required in these zones.

Source: FEMA website www.fema.gov/plan/prevent/fhm/fq_gen13.shtm

The principle of “no adverse impact” floodplain management, long advocated by many in the planning community, has been endorsed since 2000 by the Association of State Floodplain Managers as a goal for local, state and federal floodplain management. No Adverse Impact floodplain management is where the action of one property owner does not adversely impact the rights of other property owners, as measured by increased flood flows; peaks and velocity; erosion and sedimentation; degradation of water quality; or increased cost of public services. (Association of State Floodplain Managers, 2003).

The Association of State Floodplain Managers No Adverse Impact educational campaign has included publication of a “toolkit,” which provides communities with information on hazard identification and floodplain mapping, education and outreach, planning, regulations and development standards, mitigation, infrastructure, and emergency services. For each of these steps in a comprehensive floodplain management program, a range of approaches is presented, from those necessary to meet the bare minimum FEMA requirements for participation in the flood insurance program, to those which would achieve no adverse impact. In addition, several fact sheets for communities concerned about legal aspects of stricter floodplain regulation, such as takings claims, have been developed for the Association by Jon A. Kusler, Esq., Associate Director of the Association of State Wetland Managers.

Planning for the future is becoming more and more important as global warming makes future weather patterns uncertain. The US Environmental Protection Agency warns that as a result of global warming “more precipitation may come in short intense bursts (e.g., more than two inches of rain in a day), which could lead to more flooding” (USEPA, 1997). Rising sea levels associated with global warming exacerbate the increased risks of flooding in coastal communities. The EPA reports that over the last century the average temperature in Hanover, N.H., has increased two degrees F and is likely to increase several more degrees in this century. Sea level at Portsmouth is rising at a rate of seven inches per century and is likely to rise another 18 inches by 2100. Consistent with the global warming models, the frequency of extreme rainfall events is increasing.

APPROPRIATE CIRCUMSTANCES AND CONTEXT FOR USE

The Flood Hazard Overlay District provided here is appropriate for any community in New Hampshire with NFIP mapped flood hazard areas. The model ordinance is set up as an overlay district, but can be modified for communities that are interested in creating a flood hazard zone.

To maximize the effectiveness of a floodplain management program, it must be part of a regional watershed approach to managing water resources and development. There are many other issues to consider in addition to what happens in the mapped floodplain itself. For example, all too often communities adopt minimum floodplain regulations for the mapped floodplain, and then allow development in the rest of the community that could increase stormwater runoff, thereby increasing the extent of the floodplain and height of floodwaters. Components of a comprehensive approach to planning for flood hazard prevention include:

- Integration with multi-hazard mitigation planning and emergency operations planning, and coordination of these at the local, regional and state level.

- Inclusion of mitigation as part of the community's floodplain management strategy. Mitigation might include acquisition of certain properties with high value to the community for open space uses such as recreation or prime agricultural land; assistance to landowners desiring to relocate buildings onto higher ground; or moving, elevating or floodproofing important public, cultural and historic buildings.
- Dam safety inspection and maintenance.
- Review of subdivision regulations to ensure they complement the zoning ordinance requirements and do not create lots without access and building sites several feet above the base flood elevation. Plans for subdivisions in 500-year floodplains should show adequate building envelopes outside the floodplain.
- Amendment of zoning and subdivision regulations to incorporate strong stormwater management provisions to ensure that peak flows leaving development sites are not higher than prior to construction; the volume of stormwater runoff is minimized; and retention/detention facilities are appropriately sized, designed, and maintained long term (see the Stormwater Management chapter of the guidebook). Stormwater runoff from the buildings, roads, parking lots and other developed areas where soils have been compacted by human activity has typically been anywhere from 10 percent to over 100 percent higher than from undeveloped areas. The focus of typical subdivision and site plan review has traditionally been on ensuring that the proposed drainage system is adequately sized to move stormwater off of the site. The result of designing stormwater channels more efficient than nature's uneven irregular paths is not only an increase in the amount of stormwater runoff but also an increase in peak flows downstream.
- Prevention of erosion and sedimentation during and after construction. Just as floodwaters can cause erosion and sedimentation, erosion and sedimentation can increase flooding. As sedimentation fills channels, retention basins and surface waters, floodwater storage capacity is lost. (see the Sediment and Erosion Control chapter of the guidebook.)
- Building codes and associated inspections and enforcement. The state building code in New Hampshire is the International Building Code, which incorporates NFIP building standards. However, most enforcement is the responsibility of the municipality.
- Maintenance of the integrity of the hydrological cycle through protection of wetlands and vegetated buffers to ameliorate stormwater flows.
- Maintenance of vegetated shoreline buffers along rivers and streams to slow floodwaters and reduce erosion and sedimentation.
- Shoreline setbacks from all rivers and streams to protect banks and keep human activity away from the danger of flash flooding.
- Appropriate planning and design of roads and culverts. Much more has been learned about the relationship between culvert size and shape since most of our roads were built. Upgrades need to be incorporated into improvement projects.

- Continued efforts to improve mapping of flood hazard areas. Sedimentation and erosion, channel meander, and future development in upstream areas are not accounted for in traditional floodplain modeling and mapping. However, our understanding of fluvial geomorphology – how streams respond to changes in the landscape – is increasing, allowing for more accurate mapping of some flood-prone areas, including smaller headwater streams not shown on FEMA maps.
- Property tax assessments based on what development would be allowed.
- Public education on the availability of flood insurance in most New Hampshire communities and its affordability.

All of these activities together with restrictions on new development in identified floodplain areas can work to keep residents safe and costs down.

LEGAL BASIS AND CONSIDERATIONS FOR NEW HAMPSHIRE

ENABLING STATUTES

Among the techniques authorized by 674:21, innovative land use controls, are environmental characteristics zoning and performance standards. In addition, RSA 674:56 was enacted in 2006 to clarify the authority of municipalities to adopt floodplain ordinances either as part of the community's general zoning ordinance or as a stand-alone ordinance.

THE COURTS

The Association of State Wetland Managers in conjunction with Edward A. Thomas, Esq., reviewed federal and state case law together with the Association of State Floodplain Managers' No Adverse Impact policy, and reports that, "Courts are likely to provide strong support for a no adverse impact regulatory performance standard approach" (Kusler, 2003). Some of the points Kusler makes include:

- Courts have "broadly and universally" supported floodplain regulations against takings challenges, and held that regulations may substantially reduce property values.
- Takings cases that have made headlines, such as *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992), *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987), and *Dolan v. City of Tigard*, 512 U.S. 374 (1994), were "not clearly based on principles of hazard prevention" and either denied all economic use of lands (*Lucas*) or permitted the public to enter private property (*Nollan* and *Dolan*).
- The most common challenges to regulations in the last 15 years have been claims that regulators allowed development that later caused harm such as flooding or erosion. "[A] municipality is vastly more likely to be sued for issuing a permit for development that causes harm than for denying a permit based on hazard prevention or 'no adverse impact' regulations."

- Courts have held that regulatory agencies do not need to eliminate all uncertainty, including maps with some inaccuracies, if a process exists for refining the data on a case by case basis.

LOCAL CONSIDERATIONS

This model incorporates language from model ordinances developed by NH Office of Energy and Planning (OEP) for communities in the NFIP. Communities that are not in the program and will not be considering it in the next several years may be able to remove some of the language provided. The community's regional planning commission staff can help with this. In addition, communities in the NFIP should always contact the NFIP state coordinator at the OEP to have any flood management ordinance reviewed for compliance prior to adoption. Finally, all ordinances and amendments in any community should always be reviewed with an eye toward the next step of implementation and enforcement.

EXAMPLES AND OUTCOMES

New Hampshire communities are fortunate to have access to information on floodplain management through the OEP website at www.nh.gov/oep. OEP reports that quite a few communities in the state have adopted floodplain management regulations stricter than required for participation in the NFIP. Those with “no build” ordinances include: Bath, Cornish, Easton, Frankestown, Franconia, Hancock, Hanover, Litchfield, and Piermont.

Keene, Marlborough, Peterborough, Rye, and Winchester participate in FEMA's Community Rating System program. This means that residents benefit from their community's enhanced floodplain management through reduced rates on flood insurance policies. Other New Hampshire communities have gone beyond FEMA's minimum NFIP requirements as well by incorporating restrictions appropriate to their community. For example, densely developed Salem and Keene have both required compensatory storage to ensure development in the floodplains does not lead to a net loss of flood storage capacity.

The Internet makes it easy for planning board members and others to learn about approaches other communities around the country are using. Lincoln, Nebraska, for example, recently updated its floodplain management strategy to take a comprehensive watershed approach. This has included mapping smaller streams not shown on the community's FEMA maps, requirements for compensatory storage, “no net rise” in flood levels, and a vegetative buffer to help preserve the natural functions of the floodplain (Samuels, 2007).

The Association of State Floodplain Managers has compiled 11 case studies from communities around the country using No Adverse Impact approaches to reduce flood losses and reduce community liability (Association of State Floodplain Managers, 2004). The compilation includes information on tools and activities used by the communities to help other cities and towns develop approaches that best fit their needs and goals. Information on how the communities generated support for the program is also included.

Model Language and Guidance for Implementation

The following model ordinance is based on the No Adverse Impact goal. Primary differences between this model and the minimum National Flood Insurance Program requirements include:

A base flood elevation (BFE) of one foot is the current requirement. Municipalities can require a BFE as high as three feet; however, it is a substantial change. The municipality should evaluate which option is most suitable for the community based on historical flood data and document the reasons this option was chosen.

- New principal buildings are not allowed in flood hazard areas unless there is no other site available on a lot of record at the time of adoption.
- Uses with an especially high potential for causing hazardous conditions during a flood event are prohibited.
- New structures and additions must be 1 to 3 feet above the base flood elevation.
- Fill or other encroachments must be mitigated by compensatory storage.

Many of the elements of this model ordinance are FEMA Community Rating System (CRS) activities, which means the community would get points toward a reduction in flood insurance rates for residents.

MODEL ORDINANCE FOR FLOOD HAZARD AREA OVERLAY DISTRICT

I. TITLE AND AUTHORITY

A. Title

The title of this District shall be the [Town/City] of _____ Flood Hazard Area Overlay District.

B. Authority

This ordinance is adopted under the authority granted pursuant to RSA 674:16, Grant of Power, RSA 674:21, Innovative Land Use Controls, and 674:56, Floodplain Ordinances.

II. PURPOSE

The purpose of the Flood Hazard Area Overlay District is to protect the health and safety of residents by promoting the most appropriate use of land in Flood Hazard Areas, as follows:

- Uses which will result in no increase in base flood levels, flows, peaks or velocity.
- Uses which will not increase the potential for flood damage to the owner's property or that of others.
- Uses which will protect the benefits provided to the community by the floodplain.
- Uses which will result in no increase in erosion and/or sedimentation or other degradation of water quality.

This ordinance can be adopted either as an overlay district in which the underlying district determines lot sizes, density, frontage requirement, setbacks, and uses allowed by special exception, or as a separate zoning district. In the case of a separate zoning district, additional information would be needed specifying those requirements and delineating the area.

- E. Uses which will not increase the risk to public safety, or to emergency personnel during flood events, or result in an increase in the cost of public services above costs incurred when not in a floodplain.

III. FINDINGS

Certain areas of the [Town/City] of _____ are subject to periodic flooding, causing a serious threat to the health, safety and welfare of residents. These areas are shown on the Flood Insurance Rate Maps for _____ dated _____ and described in the Flood Insurance Study for _____ dated _____.

IV. APPLICABILITY

All proposed development in the Flood Hazard Area Overlay District shall require a permit.

The building inspector shall review all building permit applications for new construction, additions to existing structures, and substantial improvement to determine whether the proposed site is within the Flood Hazard Area Overlay District. If the site is determined to be within the Flood Hazard Area Overlay District, the building inspector shall review the application to ensure that the proposal is in compliance with all provisions of the District including all applicable standards contained in section XI Development Standards.

This ordinance should be administered by whatever official in the community administers the local permit requirements and has the function of initially reviewing proposed development, whether that is a building inspector, code enforcement officer, zoning administrator, town planner, board of selectmen, or other official. The title of that administrative official or body should be substituted wherever the words "building inspector" appear in this model ordinance.

- A. For all new, expanded or substantially improved structures located in Zone(s) A, A1-30, AE, A0 or AH the applicant shall furnish the following information to the building inspector:
 1. The as-built elevation (in relation to National Geodetic Vertical Datum/North American Vertical Datum (NGVD/NAVD)) of the lowest floor (including basement) and include whether or not such structures contain a basement.
 2. If the structure has been floodproofed, the as-built elevation (in relation to NGVD/NAVD) to which the structure was floodproofed.
 3. Any certification of floodproofing.
- B. For all new construction or substantially improved buildings located in Zones V, VE or V1-30 the applicant shall furnish the building inspector records indicating the as-built elevation of the bottom of the lowest horizontal structural member of the lowest floor (excluding pilings or columns) in relation to NGVD/NAVD and whether or not the structure contains a basement.
- C. The building inspector shall maintain the aforementioned information for public inspection, and shall furnish such information upon request.

Encroachment or filling anywhere in the floodplain results in a loss of storage. A number of small structures or minor areas of fill over time can cumulatively increase flood levels and damage significantly.

FEMA is converting the vertical datum on the new county maps from NGVD to NAVD, except in Rockingham and Stafford counties. The municipality should list the vertical datum that is applicable to their community's floodplain maps.

- D. The building inspector shall not grant a building permit until the applicant certifies that all necessary permits have been received from those governmental agencies from which approval is required by federal or state law, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U. S. C. 1334.
- E. The building inspector shall determine the 100-year flood elevation in the following order of precedence according to the data available:
 1. In Zone(s) AI-30, AH, AE, VI-30, and VE refer to the elevation data provided in the community's Flood Insurance Study and accompanying FIRM or FHBM.
 2. In unnumbered A zones or Zone A the building inspector shall obtain, review, and reasonably utilize any 100-year flood elevation data available from any federal, state or other source including data submitted for development proposals submitted to the community (i.e. subdivisions, site approvals).
 3. In zone A0 the flood elevation is determined by adding the elevation of the highest adjacent grade to the depth number specified on the FIRM or if no depth number is specified on the FIRM at least two feet. (Item (c.) can be deleted if there are no AO zones on the maps.)

Some communities require that developers provide detailed flood data in A zones, or in X zones, to map floodplains for all drainage areas over a certain size, e.g. 40 acres.

The onus of proving a proposed project area is not within the floodplain is on the landowner for all parcels in the overlay district.

Add or replace language as appropriate based on the most accurate and comprehensive maps of the community's flood hazard areas, and revise definitions section accordingly. As more information becomes available, other flood hazard areas not shown on the community's FIRMs can be added to the Flood Hazard Area Overlay District map.

V. BOUNDARIES

The provisions of this district shall apply to all lands designated as special flood hazard areas by the Federal Emergency Management Agency in its "Flood Insurance Study for the [Town/City/County] of _____, N.H." dated _____ or as amended, together with the associated Flood Insurance Rate Maps [*add or revise title for community's maps, e.g., "Flood Boundary and Floodway Maps"*] dated _____ or as amended, which are declared to be a part of this ordinance and are hereby incorporated by reference.

The provisions of the Flood Hazard Area Overlay District shall overlay and supplement the provisions of the underlying zoning district.

VI. DEFINITIONS

The following definitions shall apply only to this Flood Hazard Area Management Ordinance, and shall not be affected by the provisions of any other ordinance of the (Town/City) of _____.

Addition: An expansion of a structure outside of the footprint of the original building.

Area of Shallow Flooding: A designated A0, AH, or V0 zone on the Flood Insurance Rate Map (FIRM) with a 1 percent or greater annual possibility of flood-

ing to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet-flow.

Area of Special Flood Hazard: The land in the floodplain within the [Town/City] of [Name] subject to a one percent or greater possibility of flooding in any given year. The area is designated as Zone A on the FHBM and is designated on the FIRM as Zones A, AO, AH, AI-30, AE, A99, VI-30, VE, or V.

Base Flood: The flood having a 1 percent possibility of being equaled or exceeded in any given year.

Basement: Any area of a building having its floor subgrade on all sides.

Building: “Structure.”

Breakaway Wall: A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces without causing damage to the elevated portion of the building or supporting foundation.

Compensatory Flood Storage: The replacement for any loss of existing flood storage caused by development within the floodplain.

Development: Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavating or drilling operation or storage of equipment or materials.

FEMA: The Federal Emergency Management Agency.

Flood or Flooding: A general and temporary condition of partial or complete inundation of normally dry land areas from either the overflow of inland or tidal waters, or the unusual and rapid accumulation or runoff of surface waters from any source.

Flood Boundary and Floodway Map (Floodway Map): The official map of the [Town/City] of [Name] on which FEMA has delineated the “Regulatory Floodway.” This map should not be used to determine the correct flood hazard zone or base flood elevation, the Flood Insurance Rate Map (FIRM) will be used to make determinations of flood hazard zones and base flood elevations. *[Include this definition only if applicable to the community.]*

Flood Insurance Rate Map (FIRM): The official map incorporated with this ordinance, on which FEMA has delineated both the special flood hazard areas and the risk premium zones applicable to the (Town/City) of [Name].

Flood Insurance Study: An examination, evaluation, and determination of flood hazards and if appropriate, corresponding water surface elevations, or an examination and determination of mudslide or flood-related erosion hazards.

Floodplain or Flood-prone Area : Any land area susceptible to being inundated by water from any source (see definition of “Flooding”).

Flood proofing: Any combination of structural and non-structural additions, changes, or adjustments to structures that reduce or eliminate flood damage to real

To ensure compliance with NFIP requirements, all definitions contained in OEP’s New Hampshire Model Floodplain Management Ordinance Model E, January 2006, are contained herein, as well as others specific to this model.

estate or improved real property, water and sanitation facilities, structures and their contents.

Floodway: see “Regulatory Floodway.”

Freeboard: A factor of safety usually expressed in feet above a flood level for purposes of floodplain management.

Functionally Dependent Use: A use that cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking and port facilities that are necessary for the loading/unloading of cargo or passengers, and ship building/repair facilities but does not include long-term storage or related manufacturing facilities.

Highest Adjacent Grade: The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historic Structure: means any structure that is:

- a. Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
- b. Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;
- c. Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or
- d. Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
 - i. By an approved state program as determined by the Secretary of the Interior, or
 - ii. Directly by the Secretary of the Interior in states without approved programs.

Lowest Floor: The lowest floor of the lowest enclosed area including basement. An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided, that such an enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this ordinance.

Manufactured Home: A structure, transportable in one or more sections that is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. For floodplain management purposes the term “manufactured home” includes park trailers, travel trailers, and other similar vehicles placed on site for greater than 180 consecutive days. This includes manufactured homes located in a manufactured home park or subdivision.

Manufactured Home Park or Subdivision: A parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

Mean Sea Level: The National Geodetic Vertical Datum (NGVD) of 1929, North American Vertical Datum (NAVD) of 1988, or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

New Construction: For the purposes of determining insurance rates, structures for which the "start of construction" commenced on or after the effective date of an initial FIRM or after December 31, 1974, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, *new construction* means structures for which the *start of construction* commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.

One Hundred-Year Flood: "Base flood"

Recreational Vehicle: Defined as:

- a. Built on a single chassis.
- b. 400 square feet or less when measured at the largest horizontal projection.
- c. Designed to be self-propelled or permanently towable by a light duty truck.
- d. Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel or seasonal use.

Regulatory Floodway: The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Special Flood Hazard Area: See "Area of Special Flood Hazard."

Structure: For floodplain management purposes, a walled and roofed building, including a gas or liquid storage tank that is principally above ground, as well as a manufactured home.

Start of Construction: Substantial improvements, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or part of the main structure.

Substantial Damage: Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial Improvement: Any combination of repairs, reconstruction, alteration, or improvements to a structure in which the cumulative cost equals or exceeds 50 percent of the market value of the structure. The market value of the structure should equal:

- a. The appraised value prior to the start of the initial repair or improvement, or
- b. In the case of damage, the value of the structure prior to the damage occurring.

For the purposes of this definition, “substantial improvement” is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. This term includes structures that have incurred substantial damage, regardless of actual repair work performed. The term does not, however, include any project for improvement of a structure required to comply with existing health, sanitary, or safety code specifications that are solely necessary to assure safe living conditions or any alteration of a “historic structure,” provided that the alteration will not preclude the structure’s continued designation as a “historic structure.” This term does not apply to an “addition.”

Violation: The failure of a structure or other development to be fully compliant with the community’s flood plain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in 44CFR § 60.3(b) (5), (c) (4), (c) (10), (d) (3), (e) (2), (e) (4), or (e) (5) is presumed to be in violation until such time as that documentation is provided.

Water Surface Elevation: The height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929, North American Vertical Datum (NAVD) of 1988, (or other datum, where specified) of floods of various magnitudes and frequencies in the floodplains.

VII. PERMITTED USES

The following uses are permitted provided they are consistent with the purposes of this ordinance and do not involve the placement, expansion or construction of permanent structures or other materials that could impede floodwaters or become flood-carried debris:

- A. Agricultural activities consistent with current best management practices as published by the New Hampshire Department of Agriculture, Markets, and Food, including maintenance or improvement of existing crop or pasture land for continued agricultural use, as defined in Env-Wt 101.20 and described in Env-Wt 303.04(u).
- B. Forest Management consistent with current accepted best management practices. As specified in Logging Operations (Env-Wt 304.05):
 1. All skid trails, truck roads and log landings shall be located far enough from streams or ponds so that waterborne soil particles will settle out before reaching the streams or ponds.

2. Skid trails and truck roads shall be laid out using appropriate erosion control devices, as outlined in the *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire*, Department of Resources and Economic Development, April 1996, updated February 2000, so that the grade approaching a stream or pond is broken, and surface water is dispersed. Crossings of streams and wetlands shall be kept to a minimum and shall be located to minimize impact in accordance with Env-Wt 302.04(b) and (c).
- C. Outdoor recreation, such as play areas, boating, hunting, fishing, trails for motorized or non-motorized use.
 - D. Wildlife or fisheries management.
 - E. Scientific research and educational activities.
 - F. Home occupations and home businesses in existing residences consistent with _____ [community will need to identify other section(s) of zoning ordinance covering these if any].
 - G. Replacement water and sewer systems, including on-site systems, provided that the applicant shall provide the building inspector with assurance that these systems will be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, and on-site waste disposal systems will be located to avoid impairment to them or contamination from them during periods of flooding.
 - H. Substantial improvement not involving an addition.

Floodplain vegetation plays an important role in managing floodwaters and preventing erosion and sedimentation. While most communities will want to allow agriculture and forest management without a Special Exception, inspection and enforcement of vegetated buffer requirements are essential to the maintenance of a well functioning floodplain.

One of the differences between this model and those that are designed to meet minimum NFIP requirements only is the distinction between additions and other substantial improvements. From an actuarial standpoint, the monetary value of the improvement is important. From a floodplain management standpoint, the physical size of the encroachment is the relevant factor. This model therefore allows substantial improvements not involving additions as permitted uses, but requires a Special Exception for additions to ensure that there is no increased encroachment in the floodplain, or that if there is, compensatory storage is created.

VIII. PROHIBITED USES

- A. New buildings or other structures except as allowed below by Special Exception.
- B. Processing or storage of excavation materials.
- C. Storage of construction or other materials which would impede flow of floodwaters.
- D. Filling.
- E. Grading that results in obstruction of flood flows or reduces flood storage capacity.
- F. Dumping.

- G. Wastewater or septage treatment facilities.
- H. Storage of floatable, or toxic, hazardous, or regulated substances. (Quantities typical for household use are permissible if stored [1 to 3] feet or more above base flood elevation.)
- I. Unsecured tanks.
- J. Junkyards.
- K. Landfills.
- L. Subdivision of land that would create a parcel that had no developable land outside the Flood Hazard Area.

IX. USES BY SPECIAL EXCEPTION

The zoning board of adjustment may grant a Special Exception for the following uses if determined, based on evidence provided by the applicant, to be in conformance with the standards provided in Section XI below and the purposes of the Flood Hazard Area Overlay District listed in Section II above:

- A. Water impoundments for the purpose of creating a waterbody for wildlife, fire safety, on-site detention of stormwater run off and/or recreational uses.
- B. Water-dependent uses, such as docks, boathouses, and water powered projects.

If not in floodway:

- C. Additions to or replacements of existing structures, including manufactured homes.
- D. Accessory structures to existing primary uses when it is not practicable to construct the accessory structure on a portion of the lot outside of the Flood Hazard Area Overlay District.
- E. One principal building on a preexisting lot of record with no developable land outside Flood Hazard Area Overlay District.
- F. New or expanded septic systems if no suitable location exists for the system on a portion of the lot outside of the Flood Hazard Area Overlay District.
- G. Construction, repair or maintenance of streets, roads, and other access ways, including driveways, footpaths and bridges, and utility right-of-way easements, including power lines and pipe lines, wastewater collection facilities and pump stations, if essential to the productive use of land adjacent to the Flood Hazard Area Overlay District.
- H. Undertaking of a use not otherwise permitted in the Flood Hazard Area Overlay District, if it can be shown that such proposed use does not involve the erection of structures or filling and is in accordance with all of the purposes of the District as listed in Section II, and those of the underlying zoning district.

A primary goal of this model ordinance is to balance public safety with landowner needs. Only development necessary to enjoy the investment already made in floodprone property is allowed. The alternative allowed under the minimum NFIP requirements, elevating and flood-proofing, does not take other public costs and risks into account. These include the safety of emergency personnel forced to traverse flood waters to rescue people stranded in elevated buildings, or the damage to streets, utilities and other infrastructure serving development in the floodplain.

X. NONCONFORMING USES

An existing use or structure as of the effective date of this ordinance may continue, even though it does not conform to requirements of these regulations. Such non-conforming uses and structures may not be extended, enlarged, or re-established after being discontinued for more than one year.

Nor may a non-conforming use and/or structure be modified to create another non-conforming use and/or structure unless it is determined by the board of adjustment that the proposed use will not increase the degree of non-conformance with the standards contained in these Regulations.

Reconstruction of an existing structure will be allowed if for the same use, within the same building footprint, and of the same or smaller dimensions as existed within 12 months prior to reconstruction, provided the construction meets all applicable development standards of this ordinance.

XI. DEVELOPMENT STANDARDS

A. General Standards within the Flood Hazard Overlay District

1. All development, including new construction, additions, substantial improvements and fill shall be:
 - a. Designed (or modified) and adequately anchored to prevent floatation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.
 - b. Constructed with materials resistant to flood damage.
 - c. Constructed by methods and practices that minimize flood damages.
 - d. Designed to result in no increase in flood levels during the flood event.
2. No encroachments may be located in the floodway unless a registered professional engineer certifies that the proposed development will not result in any increase in base flood levels.
3. All new construction and additions to any residential or nonresidential structure shall have the lowest floor, including basement, together with attendant utility and sanitary facilities, elevated to no lower than *[one to three]* feet above the base flood elevation.

To ensure the effectiveness of many of these provisions, an active program of inspection and enforcement must follow adoption.

The **base flood elevation** is that which models predict has a 1 percent chance of occurring each year. It is recommended that communities allow for some room for error above this figure, at least one foot, preferably three feet. The flood elevation models do not account for debris, downstream obstructions, or future development occurring in upstream communities without adequate stormwater regulations, or who allow development in the floodplain to increase flood levels. In addition, in any given year a larger storm than the 1 percent chance storm might occur. This margin of safety against known and unknown risks, and modeling and mapping limitations is called "Freeboard."

Requirements that buildings be elevated are not enough by themselves. Flood waters can cause damage to elevated buildings through erosion, scouring and settling. Offering the alternative that buildings be elevated with fill instead of columns provides safety for the occupants of the property when outside of the building.

A requirement for **compensatory storage** is an essential component of a floodplain management ordinance if fill is allowed as a means of elevating structures or utilities. Otherwise the ability of the floodplain to store floodwaters is decreased over time, and flood levels and damage will increase.

4. All utilities, including electrical, heating, ventilation, plumbing, air conditioning, and other service facilities, including ductwork, shall be elevated or made of flood resistant materials up to [one to three] feet above base flood elevation, and designed and located to prevent water from entering or accumulating within the components during conditions of flooding.
5. All new buildings and additions to existing buildings must be constructed on foundations that are approved by a licensed professional engineer, or constructed on properly designed and compacted fill (ASTM D-698 or equivalent) that extends beyond the building walls before dropping below the level which is [one to three] feet above the base flood elevation and has appropriate protection from erosion and scour. The fill design must be approved by a licensed professional engineer.
6. All recreational vehicles shall either: be on the site for fewer than 180 consecutive days; be fully licensed and ready for highway use; or meet all standards of Section 60.3 (b) (1) of the National Flood Insurance Program Regulations and the elevation and anchoring requirements for “manufactured homes” in Paragraph (c) (6) of Section 60.3. These regulations specify that recreation vehicles need to be built on enclosed areas to lift the lowest floor to the required freeboard height and that the enclosed areas must have openings to allow the floodwaters to enter and exit. The design of the openings must meet or exceed the minimum criteria listed in the model ordinance. If the minimum criteria are not feasible, then the openings have to be designed by a registered professional engineer or architect, who must certify the openings.
7. Where new or replacement water and sewer systems, including on-site systems, are proposed in a special flood hazard area the applicant shall provide the building inspector with assurance that these systems will be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, and on-site waste disposal systems will be located to avoid impairment to them or contamination from them during periods of flooding.
8. The space occupied by fill, including mounded septic systems, or structure below the level which is [one to three] feet above the base flood elevation shall be compensated for and balanced by a hydraulically equivalent volume of excavation taken from below the base flood elevation. All such excavations shall be constructed to drain freely to the watercourse.
9. Nonresidential development, including buildings and fill, shall be limited to 10 percent of the lot.

This is an optional requirement designed to enable some development in areas the community has designated for nonresidential while recognizing that some floodplain values are lost even with compensatory storage.

10. Proposed structures to be located on slopes in special flood hazard areas shall include adequate drainage paths to guide floodwaters around and away from the proposed structures.

11. The activity must be sited and designed to minimize disruption to shorelines and their banks.

B. Additional Requirement for Coastal High Hazard Areas

The following regulations shall apply to coastal high hazard areas, designated as Zone(s) V, V1-30 and VE:

1. All new construction or substantial improvements are to be elevated on pilings and columns so that:
 - a. The bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to *[one to three]* feet above the base flood level; and
 - b. The pile or column foundation and structure attached thereto is anchored to resist floatation, collapse, and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable state and local building standards.
2. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of this section.
3. The space below the lowest floor must either be free of obstructions or constructed with non-supporting breakaway walls, open lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. For the purposes of this section, a breakaway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Such enclosed space shall be usable solely for the parking of vehicles, building access, or storage.
4. The use of fill for the structural support of buildings is prohibited.
5. Man-made alterations of sand dunes that would increase potential flood damage are prohibited.
6. All new construction or substantial improvements within Zone(s) V1-30, VE, and V on the FIRM shall be located landward of the reach of mean high tide.

C. Additional Standards for Watercourses

[Note: If the community has a local wetlands ordinance, this section should be integrated with it, and the name of the board or title of the official who makes decisions on local wetlands permits should be inserted for "building inspector."]

1. In riverine situations, prior to the alteration or relocation of a watercourse the applicant for such authorization shall notify the Wetlands Bureau of the New Hampshire Department of Environmental Services and submit copies

of such notification to the building inspector, in addition to the copies required by the RSA 482-A: 3. Further, the applicant shall be required to submit copies of said notification to those adjacent communities as determined by the building inspector, including notice of all scheduled hearings before the Wetlands Bureau (add here notice of local wetlands hearings if the community has a local wetlands ordinance).

2. The applicant shall submit to the building inspector certification provided by a registered professional engineer assuring that the flood carrying capacity of an altered or relocated watercourse can and will be maintained.

D. Standards for Substantial Improvements Not Involving Additions and Not in Coastal High Hazard Area

1. Residential structures to be substantially improved shall have the lowest floor (including basement) elevated to or above the 100-year flood elevation.
2. Nonresidential structures to be substantially improved shall have the lowest floor, including basement, elevated to or above the 100-year flood level; or together with attendant utility and sanitary facilities, shall:
 - a. Be floodproofed so that below the 100-year flood elevation the structure is watertight with walls substantially impermeable to the passage of water;
 - b. Have structural components capable of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy; and
 - c. Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting the provisions of this section.

E. Additional Standards for Manufactured Homes

All manufactured homes to be placed or substantially improved within special flood hazard areas shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is at least *[one to three]* feet above the base flood level; and be securely anchored to resist floatation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors.

F. Additional Standards for Recreation Vehicles

All recreational vehicles placed on sites within special flood hazard areas shall be either:

1. On the site for fewer than 180 consecutive days;
2. Fully licensed and ready for highway use; or
3. Meet all standards of Section 60.3 (b) (1) of the National Flood Insurance Program Regulations and the elevation and anchoring requirements for “manufactured homes” in Paragraph (c) (6) of Section 60.3, in addition to e. above.

XII. VARIANCES AND APPEALS

- A. Any order, requirement, decision or determination of the building inspector made under this ordinance may be appealed to the zoning board of adjustment as set forth in RSA 676:5. *[Note: In communities with no comprehensive zoning, a special board of adjustment appointed by the board of selectmen.]*
- B. If the applicant, upon appeal, requests a variance as authorized by RSA 674:33, I (b), the applicant shall have the burden of showing, in addition to the usual variance standards under state law, that the use, along with any mitigating measures proposed, will not:
1. Result in any increase in base flood levels, flows, peaks or velocity.
 2. Increase the potential for flood damage to the owner's property or that of others.
 3. Result in increased erosion and/or sedimentation or other degradation of water quality.
 4. Increase the risk to public safety or emergency personnel during flood events, or increase the cost to the public by virtue of its location in a flood hazard area.

The variance must additionally be the minimum necessary, considering the flood hazard, to afford relief.

- C. The zoning board of adjustment shall notify the applicant in writing that:
1. The issuance of a variance to construct below the base flood level will result in increased premium rates for flood insurance up to amounts as high as \$25 for \$100 of insurance coverage; and,
 2. Such construction below the base flood level increases risks to life and property.

Such notification shall be maintained with a record of all variance actions.

- D. The community shall:
1. Maintain a record of all variance actions, including their justification for their issuance, and
 2. Report such variances issued in its annual or biennial report submitted to FEMA's Federal Insurance Administrator.

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